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PATENT SPECIFICATION

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Application Date (In United Kingdom), Oct. 22, 1919. No. 25,936/19.

Complete Accepted, May 6, 1920.

COMPLETE SPECIFICATION.

Improved Apparatus for Varying the Adjustment of the Guide Blades in Centrifugal Compressors.

We, Aktiengesellschaft Brown, Boveri & Cie., of Baden, Switzerland, Manufacturers, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

It is known to regulate centrifugal compressors by varying the adjustment of the guide blades. The reason why this method of regulating has been employed only seldom hitherto in the case of blowers and compressors, is due mainly to the fact that simple and reliable apparatus for effecting this method of regulation have not been available hitherto.

The present invention has for its object to remedy this drawback, and consists in an apparatus which allows by simple means, of varying the adjustment of the guide blades for regulating the volume of the delivery and for preventing surging of the latter. For this purpose the adjustment of the angle of the blade and of the free passage apertures between the guide blades is produced by a simultaneous rotary and advancing motion of the guide blades, avoiding the use of pivot pins and sliding guiding parts. Apparatus according to this principle can be constructed by simple means, and they allow of selecting the clearance, blade angle and free passage cross sections in centrifugal compressors, to suit the requirements in each case.

For producing the simultaneous rotary and advancing motion of the guide blades there is employed preferably an apparatus wherein the guide blades are fixed to toothed wheels that are situated between two concentric rings having corresponding external and internal teeth, and are caused by a relative motion of the two rings to roll between the latter, and thereby impart to the guide blades connected to them a simultaneous rotary and advancing motion.

An apparatus of this kind is illustrated by way of example as a constructional form of the invention, in Fig. 1 of the accompanying drawings. Between the two concentric toothed rings B and C formed with external and internal teeth respectively, there are situated the toothed wheels A to which the guide blades D are fixed, such wheels receiving only a partial rotation.

In many cases a small rotary motion will be sufficient to cover the entire range of regulation. In such cases a portion of the toothed wheels A may be omitted, as shown in Fig. 2.

In many cases it is even sufficient if only a single tooth is engaged in each toothed ring. For the purpose of simplifying the manufacture, the shape of this tooth may be made somewhat different from that usually employed in toothed wheels. A construction of this kind is shown in Fig. 3.

Knife edges may be employed instead of such single teeth. This arrangement produces the constructional form shown in Fig. 4.

[*Price* 1/-]

The employment of apparatus of this kind for actuating the guide blades of compressors and blowers has the great advantage that the use of pivot pins and sliding guide pieces is entirely avoided.

In order to allow the teeth and toothed rings actuating the guide blades to be arranged outside the path of the air flow of the guide nozzle passages, the auxiliary devices must be separated from the actual guide blades by means of a partition. This partition may be arranged in the manner illustrated in Figs. 5 and 6 in cross section and side elevation with the wall H omitted in Fig. 6. In these figures F is the partition provided on the toothed ring B. It shuts off the space in which the guide blades D are situated, and constitutes on one side the boundary of the nozzle passages which are bounded on the other three sides by two guide blades and an outer closing wall H, respectively. The part G that connects the guide blades D to the toothed wheel sectors A between the rings B and C, is carried through the partition F. It is essential that the aperture for this purpose shall not be provided in the centre of the partition F but in the outer portion of the latter. The consequence of this arrangement is that the interruption necessitated in the partition F for this aperture, is thereby situated outside the range of the nozzle action (that is to say, outside the partition F in Fig. 6).

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. An apparatus for varying the adjustment of the guide blades in centrifugal compressors for the purpose of regulating the volume of the delivery and preventing surging of the latter, characterised by the feature that the adjustment of the blade angle and the free passage openings between the guide blades is effected by a simultaneous rotary and advancing motion without the use of pivot pins and guides.

2. An apparatus as claimed in Claim 1, wherein the guide blades are fixed to toothed wheels which are interposed between two concentric rings having respectively external and internal teeth, and are caused by motion of the two rings relatively to each other to roll between the said rings, and thereby impart to the guide blades connected to them a simultaneous rotary and advancing motion.

3. An apparatus as claimed in Claim 2, wherein only that portion of the circumference of the toothed wheel that engages, in rolling, with the toothed rings, is made of circular shape and is provided with teeth.

4. An apparatus as claimed in Claim 3, wherein that portion of the circumference of the toothed wheel engaging with the toothed rings is formed with only one tooth opposite each toothed ring.

5. An apparatus as claimed in Claim 4, wherein the portion of the circumference of the toothed wheel situated opposite each toothed ring, is provided with a tooth formed after the fashion of a knife edge.

6. An apparatus as claimed in any one of Claims 2 to 5, wherein the part that connects the guide blades to their toothed wheels is carried through the fixed partition bounding the nozzle passage, outside the range of the nozzle for the purpose of bringing the interruption (necessary for this purpose) in the partition out of the range of the nozzle action.

7. The improved apparatus for varying the adjustment of the guide blades in centrifugal compressors, constructed and operating substantially as hereinbefore described and also as illustrated in and by the accompanying drawings.

Dated this 22nd day of October, 1919.

MARKS & CLERK.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1920.

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

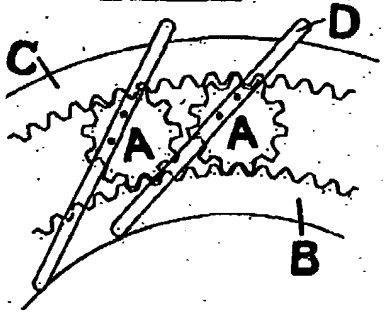


Fig. 2.

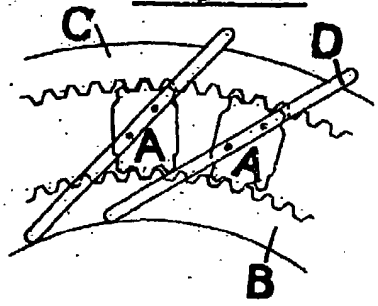


Fig. 3.

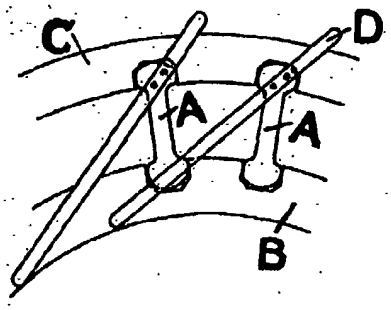


Fig. 4.

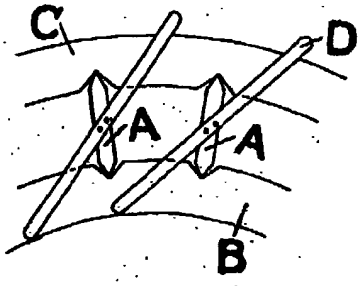


Fig. 5.

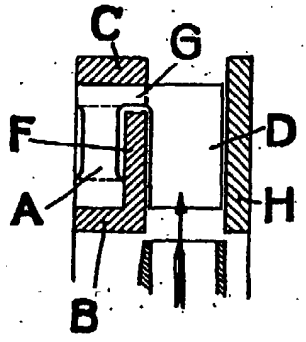
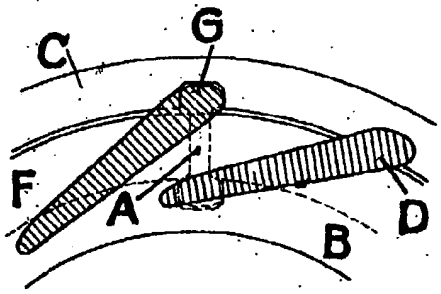


Fig. 6.



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